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AN EXPERIMENT WITH THE FRUIT OF RED BANEERRY.

ALICE E. BACON.

SOME years ago several plants of the red baneberry (*Actaea spicata*, var. *rubra*, Ait.) were transplanted to a sheltered spot in Bradford, Vermont, along the base of a veranda facing the east, and shaded by maples. The situation proving favorable, the plants each year have been very ornamental, being of unusual size and producing very large clusters of fruit. The graceful, lace-like leaves and the vivid crimson of the berries attract a great deal of attention, and the questions are often asked: "Where did you get such beautiful plants?" "What can they be?" and "Are n't those berries good to eat?"

An examination of several works on *Materia Medica* failed to show anything as to the properties of the red-berried species, although those of the white-berried were carefully noted. In the fear that children, attracted by the beauty of the fruit, might eat to their own undoing, an experiment in the qualities of the berries was entered upon with the following result.

A small dose was taken after the mid-day meal, as caution seemed advisable; but the only effect noted was a slight burning in the stomach. The question, however, of children eating the forbidden fruit was definitely settled at once, as no child, youth, sane adult, not even a hungry school-boy would ever devour it from deliberate choice; the taste is most nauseous, bitter, puckery; indeed, several even more drastic adjectives might be applied with perfect truth.

Having survived the first attempt, the experimenter hopefully tried again two days later, allowing time for the first dose to be completely

eliminated from the system. On this occasion double the first quantity was taken, and in less than half an hour there was a decided quickening of the pulse and a return of the burning in the stomach, this time more severe than before. These symptoms were transient, lasting perhaps fifteen minutes.

Two days later twice the former amount was taken. Half an hour afterward all curiosity on the subject of red baneberry was abundantly satisfied, for this one experimenter at least. At first there was a most extraordinary pyrotechnic display of blue objects of all sizes and tints, circular with irregular edges; as one became interested in the spots a heavy weight was lowered on the top of the head and remained there, while sharp pains shot through the temples.

Then suddenly the mind became confused and there was a total disability to recollect anything distinctly or arrange ideas with any coherency. On an attempt to talk, wrong names were given to objects, and although at the same time the mind knew mistakes were made in speech, the words seemed to utter themselves independently.

For a few minutes there was great dizziness, the body seeming to swing off into space, while the blue spots changed to dancing sparks of fire. The lips and throat became parched and the latter somewhat constricted; swallowing was rather difficult; there was intense burning in the stomach with gaseous eructations, followed by sharp colicky pains in the abdomen and also pain across the back over the kidneys. The pulse rose to 125, was irregular, wiry, tense; the heart fluttered most unpleasantly.

These symptoms lasted about an hour and were followed by a feeling of great weariness, but in three hours from the time of taking the dose all seemed to be again normal. The experiment was carried no further, as the effects in heart and brain were danger signals not to be ignored.

The conclusion reached is, that while the very unpleasant taste will prevent it from being dangerous in general, the fruit of the red baneberry evidently contains a poison having a powerful effect on circulation and brain; a dozen berries would probably be enough for a fatal dose, half that amount sufficing for the above experience.

BRADFORD, VERMONT.

[The above account of Miss Bacon's rather heroic experiments is of special interest, since it proves conclusively a fact which has hitherto been gravely questioned; for serious doubts have been expressed regarding the poisonous properties of *Actaea*. Thus, in a very detailed discussion of the genus by Messrs. J. U. & C. G. Lloyd (Drugs and Medicines of North America, 232-243), we find the following note: "The English plant, *Actaea spicata*, has acquired a reputation as a poisonous plant that it seems to us must be in most part unmerited. By old writers the plant was said to grow in dark recesses and to emit a fetid smell, which attracted toads, hence it is called toad plant. The berries were supposed to be poisonous, and the entire plant to poison cattle. Our native plants, which could hardly be distinguished from the foreign, seem to be entirely innocent of poisonous properties, and certainly do not emit any disagreeable odor."— Ed.]

LIST OF DESMIDS FOUND IN CARVER'S POND, BRIDGE- WATER, MASSACHUSETTS.

JOSEPH A. CUSHMAN.

THE making of this list has taken some of the spare time of three summers, but the time thus spent has been well repaid. Interest was awakened by the discovery of one or two species which were given as southern in Wolle's Desmids of the United States. By persistent search many species were found, which, according to the latest edition of that work, have not hitherto been reported from this section of the country.

The pond in which these were collected is admirably situated for such plants and abounds in other forms of Algae as well as in Desmids. It is a shallow pond, but few portions being over six feet deep and the larger part of its area averaging less than half this depth during the summer months. In spite of its shallowness it is not stagnant as it is fed by two brooks and has an outlet at the opposite end. It covers about forty-two acres and is large enough and the conditions of its borders sufficiently varied to give a considerable difference in species in different parts. A record was kept in order to determine the frequency of occurrence of various species. The list is here given with the author of the species as given in the last edition of Wolle's Desmids of the United States.

Hyalotheca dissiliens (Smith) Breb. Seems to occur most frequently in the middle of Spring, being much less frequent later in the season. Common. Found nearly choking a small pool by the side of one of the brooks which feed the pond.

Bambusina Brebissonii Kg. Found frequently and in various stages of development.

Desmidium cylindricum Grev. Occasional.

D. Swartzii Ag. Very common.

D. aptogonium Breb. Not commonly found.

D. Baileyi Ralfs. Very common. Intermingled often with *D. Swartzii*.

Sphaerosozma pulchrum Bailey. Typical form frequent. Var. *planum* Wolle. Found frequently.

S. filiforme Rab. Fairly frequent. (No sheath observed.)

Spirotaenia condensata Breb. Rare. But few specimens found.

Penium closterioides Ralfs. Common.

Closterium macilentum Breb. Fairly rare; found but a few times.

C. acerosum (Schränk) Ehrb. Very common.

C. striolatum Ehrb. Common.

C. Dianae Ehrb. Common.

C. acuminatum Kg. Frequently found.

C. robustum Hast. Found at surface in September 1900 in great numbers with *Anabaena*, etc. Have not found this form before or since.

C. rostratum Ehrb. Fairly common.

C. setaceum Ehrb. Frequent.

C. Brebissonii Delp. Common in a collection made July 4, 1902. Not observed before.

C. ovale Ralfs. Common.

Docidium crenulatum (Ehrb.) Rab. Fairly frequent.

D. trabecula (Ehrb.) Naeg. Common.

D. truncatum Breb. Fairly common.

D. baculum (Breb.) D'By. Fairly frequent.

D. nodosum Bail. Fairly frequent.

D. coronatum. Rab. Frequent.

D. repandum Wolle. Rare.

Cosmarium moniliforme Ralfs. Fairly common.

C. tumidum Lund. Common.

C. taxichondrum Lund. Common.

C. pyramidatum Breb. Common.

C. margaritifera Menegh. Common.

C. Botrytis Menegh. Common.

C. reniforme (Ralfs.) Arch. Granules fully as large as figured by Wolle. Not rare.

C. suborbiculare Wood. Frequent.

C. amoenum var. *tumidum* Wolle. Frequent.

C. Schliephackeanum Grun. Rare.

C. ornatum Ralfs. Common.

Tetmemorus Brebissonii (Menegh.) Ralfs. Fairly frequent.

Arthrodesmus octocornis Ehrb. Frequent.

Euastrum magnificum Wolle. Rare.

E. ansatum Ralfs. Common.

E. affine Ralfs. Common.

E. verrucosum (Ehrb.) Ralfs. Fairly common.

E. gemmatum Breb. Not common.

E. elegans Kg. Fairly common.

E. integrum Wolle. Frequent.

Xanthidium antilopaeum (Breb.) Kg. var. *polymazum* Nord. Few specimens found.

Micrasterias radiosa (Ag.) Ralfs. Common.

M. furcata (Ag.) Ralfs. Not common but have found frequent specimens, some deformed ones with the second pair of basal arms wanting.

M. Americana (Ehrb.) Kg. Not rare, but not occurring as frequently as other forms.

M. Americana var. *recta* Wolle. Rare; seen only a few times.

M. Mahabuleshwariensis Hobson. Fairly frequent.

M. laticeps Nord. Fairly frequent.

M. muricata Bailey. Frequent.

Staurostrum polymorphum Breb. Common, in various forms, varying in semi-cells of the same individual.

S. macrocerum Wolle. Rare.

S. leptocladum Nord. Not common.

S. anatinum Cooke & Wills. Fairly frequent.

S. muticum Breb. Common.

S. orbiculare (Ehrb.) Ralfs. Common.

S. crenulatum Naeg. Fairly common.

S. punctulatum Breb. Fairly common.

Also the following species of *Pediastrum* may be mentioned here as common occurring with the Desmids.

Pediastrum Boryanum (Turpin) Menegh.

P. pertusum Kg.

P. Ehrenbergii (Corda) A. Br.

BRIDGEWATER, MASSACHUSETTS.

ORCHIDS OF CHESTERVILLE, MAINE.

LILLIAN O. EATON.

FOR the past five summers it has been especially interesting to the writer to search for orchids in Chesterville, Maine. As the town contains several bogs, many swamps, forests of varied character, a large sand-plain, and a long esker called "the Ridge," the possibility of finding many species has seemed great. Nor has the result been wholly disappointing. To the present date, I have found twenty-six representatives, a specimen of each being in my herbarium, while it seems not unreasonable to hope a few more may be discovered.

The list, with localities of the plants, is as follows.

Microstylis ophioglossoides, Nutt. In wet pasture, growing with *Vaccinium macrocarpon*; also in evergreen swamps.

Liparis Loeselii, Richard. Not unusual in old fields.

Corallorhiza innata, R. Br. In wet soil of deciduous woods, found but once, in June, 1897.

C. multiflora, Nutt. Several stations in evergreen swamps.

Listera cordata, R. Br. Plenty in cold wooded swamp, near Chesterville Plains.

Spiranthes cernua, Richard. The various forms abound in swales and meadows also by roadsides.

S. gracilis, Bigelow. Occasional by roadsides and in dry pastures.

Goodyera pubescens, R. Br. Fairly common in rich woods.

G. repens, R. Br., var. *ophioides*, Fernald. A single plant was found in deciduous woodland in 1898. In 1901 and 1902, several were found in a cedar swamp.

G. tessellata, Lodd. Occurs both in evergreen and hardwood growths, not rare.

Arethusa bulbosa, L. On a sphagnum bog, found two successive seasons; but not more than twenty-five plants in all. The only station yet known in the county.

Calopogon pulchellus, R. Br. Grows freely on at least three bogs.

Pogonia ophioglossoides, Nutt. Abundant in meadows, bogs and damp swales.

Habenaria tridentata, Hook. Roadsides and fields, occasional.

H. virescens, Spreng. In an old field, the only station so far known in the county. In 1899 and 1900, I found two or three plants each

season. In July, 1902, the plants were fairly abundant in the same field.

H. hyperborea, R. Br. In a swamp near the Plains, also in one swamp two miles farther south.

H. dilatata, Gray. Plenty on a bog in an open grassy space near the Plains.

H. obtusata, Richard. Abundant in a cold wooded swamp near the Plains.

H. Hookeri, Torr. In dry woods near North Chesterville, also on the side of the Ridge.

H. orbiculata, Torr. Not uncommon in rich woodlands.

H. blephariglottis, Torr. Plenty in two bogs, a few plants having been found on a third.

H. lacera, R. Br. Frequent in old fields.

H. psycodes, Gray. Fairly common in meadows and roadside ditches.

H. fimbriata, R. Br. Very abundant in wet soil in open woods. I have also found the pale and white forms.

Cypripedium pubescens, Willd. Occasional in wet woods.

C. acaule, Ait. Common in evergreen forest.

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OBSERVATIONS ON ECHINODORUS PARVULUS.

EDWARD L. RAND.

(Plate 45, figures 4 and 5.)

WINTER POND in Winchester, near Boston, Massachusetts, has long been known as a station for the rare little plant, *Echinodorus parvulus*, Engelm. Of late years, however, for one reason or another, the plant has not often been found here by botanists, so that some question had arisen whether it had not become very scarce or perhaps disappeared. Such, fortunately, has proved not to be the case, for on October 13th, 1901, and subsequently, Mr. E. F. Williams and I found it in abundance. Our first trip to the pond, although late in the season was well timed. Very little rain had fallen for several weeks, and in consequence, the water in the pond was, I

judge, somewhat below, or certainly as low as its summer level. If indeed, the water had been a very little higher, nearly all the plants of *Echinodorus* would have been partly or wholly submerged.

We first found very small plants growing on the shore in soft mud. These showed occasional flowers and much fruit, as might have been expected at this season of the year. Afterwards we found larger terrestrial plants, and submersed plants also, the latter growing often nearly a foot under water. Thus a good opportunity was given for observing the plant in its various forms. Certain of its characters omitted from botanical descriptions seem worthy of record here.

Many of the terrestrial plants, especially those not far from the water's edge, showed traces of decaying leaves at the base of the fresh green lanceolate or spatulate leaves mentioned in all the descriptions. By tracing plants to the water it was found that these decaying leaves were the remains of their pellucid, membranous phyllodia, which are the submersed primary leaves of the plant. These phyllodia form almost its entire foliage until through lowering of the water level the plant emerges, when they soon decay. The secondary or terrestrial leaves, which have already begun to show themselves while the plant is in shallow water, then rapidly develop. When fresh, the phyllodia are lance-linear, tapering to a point, 2 to 3 cm. long and 2 to 3 mm. broad, with no distinction of blade and petiole. So far as I am aware these submersed leaves have not been definitely mentioned in descriptions of this plant, except in the first edition of Gray's Manual, where, however, under the name *E. subulatus*, Engelm., the species was confused with *Sagittaria pusilla*, Nutt.

In one part of the pond *Echinodorus* was growing in a depth of from half a foot to a foot of water on a cleaner, more sandy bottom. Here it was easy to study the plants in their submersed form. Not only were the phyllodia, I have mentioned, conspicuous, but also the creeping and proliferous character of the shoots. A number of colonies of three or four connected plants were observed. Here I was surprised to find also a number of plants with fresh, newly opened flowers some distance under water. Although *Echinodorus* does not appear to be so true an aquatic as *Subularia* it seems that it does sometimes bloom in its submersed state. How constant this character is, may be a good subject for investigation. It is certain the plant normally develops its flower buds sometimes in a depth of water that practically permits little chance for aerial anthesis.

The lateness of the season of course gave me an excellent opportunity to examine the plant in full fruit. After a careful examination of many plants I failed to find any trace of that regularity of arrangement of the achenes on the receptacle attributed to this species of *Echinodorus* in some botanical works. There seems, therefore, no cause to refer the species to *Alisma*, as several authors have done.

BOSTON, MASSACHUSETTS.

THE GENERIC POSITION OF ECHINODORUS PARVULUS.

B. L. ROBINSON.

(Plate 45, figures 1-10.)

WHILE examining some excellent material of the rare *Echinodorus parvulus*, Engelm., kindly placed at my disposal by E. L. Rand, Esq., I have had occasion to review the opinions, which have been expressed regarding the correct classification of this species, and some notes on the subject may be of interest.

The North American plant bearing this name was originally described by Dr. George Engelmann¹ as *Echinodorus subulatus*. It was so named under the impression that it was the *Alisma subulatum* of Linnaeus,² a species which later proved to be *Sagittaria pusilla*, Nutt. Our little *Echinodorus* was accordingly rechristened by Engelmann³ and called *E. parvulus*. The propriety of this change can scarcely be questioned when we consider that the earlier name, *E. subulatus*, rested upon a confusion of two quite distinct elements, namely, the synonym *Alisma subulatum* and a true *Echinodorus*. In such cases it may be assumed that the status of the combination should be determined rather by the name-bearing synonym than by the material which was erroneously identified with it.

Echinodorus parvulus matures about fourteen carpels, which being arranged spirally upon a strongly convex receptacle form a

¹ Engelm. in Gray, Man. ed. 1, p. 460 (1848).

² Spec. Pl. i. 343 (1753).

³ Engelm. in Gray, Man. ed. 2, p. 438 (1856).

globose head quite after the manner of the achenes in a *Ranunculus*. This is well shown in the excellent drawing by Mr. F. Schuyler Mathews, Plate 45, figure 2. The individual carpels (figure 3) are reddish brown, strongly 5-ribbed on the back and 3-ribbed ventrally. The stigma is essentially sessile and the beak at maturity very small or wanting. *Echinodorus*, although named by Richard¹ and treated by several subsequent authors as a section of *Alisma*, was first described as a genus by Engelmann, and was separated from *Sagittaria* chiefly by its perfect flowers and from *Alisma* by the fact that the achenes are thus arranged in a head and not in a ring. The genus has been sustained by the two high authorities, Buchenau and Micheli, who have subsequently given monographic attention to the *Alismaceae*. The distinction becomes especially clear when as in Professor Buchenau's admirably lucid treatment² the genus *Alisma* is confined to its more typical species. The marked difference in the fruit will be readily apparent if the reader will examine figures 2 and 10, representing the fruit of *E. parvulus* and *E. radicans* respectively, and will compare them with figure 9, showing the fruit of our common *Alisma Plantago*.

In 1830, some eighteen years before our little North American *Echinodorus* was characterized, a South American plant of identical habit from the palm swamps of Brazil was very fully described as *Alisma tenellum*, Mart.³ The carpels of this Brazilian plant were described as "4-12, plures ut videtur abortivae, in orbem fere dispositae, attamen minus regulariter et multo minus approximatae quam in *A. Plantagine*" and in a later figure, published in the *Flora Brasiliensis* by Seubert, the carpels are clearly represented in a single ring. This figure accurately redrawn is shown in figure 6 of plate 45. In 1868 Professor Buchenau⁴ in a general recension of the *Alismaceae* transferred *Alisma tenellum* to *Echinodorus*, forming the new combination *Echinodorus tenellus*. At the same time he states⁵ that he had found no specific distinctions between this South American plant and the North American *E. parvulus*. Micheli⁶ in the most exhaus-

¹ *Mém. Mus. Par.* i. 365 (1815).

² Buchenau in *Engl. & Prantl, Nat. Pflanzenf.* ii. Abt. 1, 227-232.

³ Martius acc. to J. A. & J. H. Schultes, *Syst.* vii. pt. 2, 1600 (1830).

⁴ *Abh. naturw. Ver. Bremen*, ii. 21 (1868).

⁵ Buchenau, l. c., 38.

⁶ Micheli in A. & C. DC. *Monog. Phan.* iii. 48 (1881).

tive revision of the group, which has yet appeared, also treats *E. parvulus* as a synonym of *E. tenellus*. Curiously neither Buchenau nor Micheli speaks of the uniseriate carpels, originally described in Schultes' *Systema*¹ and so clearly figured by Seubert in the *Flora Brasiliensis*,² although both of the later authors refer to the plate in question. Struck by the difference between the North American and the figure of the Brazilian plant I have examined all the South American specimens of *Alisma tenellum* (*Echinodorus tenellus*) in the Gray Herbarium and find that they agree perfectly in having capitate, spirally arranged achenes, quite in the manner of the North American *E. parvulus*, with which, in other respects also, the South American plant appears specifically identical.

The question at once presents itself whether we have here to do with two South American plants, one with achenes in a single ring and the other with achenes in a head. There are many reasons, however, for believing that this is not the case, but that not only the original description of *Alisma tenellum* but Seubert's description and figure are entirely in error in representing the carpels in a single ring. This question can only be decided by the examination of the original material of the species. Happily, to those of us who apply priority under the genus, the doubt about the true South American *Alisma tenellum* will in no way affect the standing of our own *Echinodorus parvulus*.

Until 1895 the North American plant was uniformly referred to *Echinodorus*, but of late in the *Memoirs of the Torrey Botanical Club*,³ in the *Illustrated Flora*,⁴ and in Professor Britton's recently issued *Manual*,⁵ it is classified as an *Alisma*. It is natural to suppose that this transfer, made in direct opposition to the expressed views of three such authoritative writers and specialists upon the *Alismaceae* as Engelmann, Buchenau, and Micheli, would have demanded more than ordinary care and attention to the actual characters; and it is accordingly disappointing to find, on the contrary, that the fruit, in which, as we have seen, the chief generic distinctions are to be found, instead of being critically studied could not have received even the most cursory inspection by the writers making the transfer.

As shown above, the early representation of *Alisma tenellum*, pub-

¹ vii. pt. 2, 1600 (1830).

⁴ i. 85 (1896).

² Seubert in Mart. Fl. Bras. iii. pt. 1, 105 (1847), t. 13, f. II.

³ v. 24 (1895).

⁵ p. 54 (1901).

lished in the *Flora Brasiliensis*¹ and reproduced in our figure 6, is of a very doubtful nature. If it is correct it must represent an otherwise unknown South American plant, which with its single row of carpels certainly can have nothing to do with our North American capitate-fruited *Echinodorus parvulus*. If, however, we choose the other horn of the dilemma and assume that *Alisma tenellum* was in reality nothing but *Echinodorus parvulus*, we are forced to the conclusion that the figure in the *Flora Brasiliensis* is a mistake as to carpels.

It is truly remarkable that another artist in preparing the figure for the *Illustrated Flora* has fallen into the same curious error and has produced a picture which in its contours, in the curve of each filament, and in the annular arrangement of the carpels, is so like a looking-glass replica of the one in the *Flora Brasiliensis*, that it would be hard to believe that it had not been mechanically reproduced, were we not informed in the preface of the *Illustrated Flora* that the cuts for the work were "all from original drawings." Unfortunately, the accompanying text is also neither accurate nor consistent. On page 84 *Alisma* is said in the key to have the carpels in a ring, but it is described a few lines below as having the ovaries in one or several whorls. On page 85, although figured with achenes in a single ring, *Alisma tenellum* is described as having its achenes in several whorls. As we have seen, whatever may have been the case in the original *A. tenellum*, the achenes of the North American plant under discussion are neither in a ring nor in several whorls, but are spirally arranged in a head, and in this regard, as in every other, the plant is a good *Echinodorus*, the genus to which it has been uniformly referred in all editions of Gray's Manual and by the foreign specialists who have worked upon the group.

There are in North America three species of *Echinodorus*, each of which is beautifully characterized by its carpels. In the little *E. parvulus*, the rarest of the three, they are (as shown in figure 3) rounded at maturity, glandless and essentially beakless. In *E. rostratus*, Engelm. (*E. cordifolius* Griseb.) they are (as shown in figure 8) provided with a conspicuous erect beak and with two small amber colored glands on each lateral face near the summit, while in *E. radicans*, Engelm. (figure 7) the beak is incurved and there is a single

¹iii. pt. 1, t. 13, f. II.

larger gland near the centre of each lateral face. *E. parvulus* is the only one of these species as yet found in the northeastern states and in this region seems to have been found only at the Winter Pond station in Winchester, Massachusetts, and many years ago in fresh water pools near Mt. Auburn, Massachusetts. The species has been found several times in the neighborhood of St. Louis, Missouri, and on the Illinois side of the Mississippi by Dr. Engelmann and by Mr. Henry Eggert, at Canterbury, Delaware by Mr. W. M. Canby, on the Santee Canal, South Carolina, by Mr. H. W. Ravenel, in Decatur County, Georgia, by Mr. R. M. Harper, and at Tampa and Dunnellon, Florida, by Mr. A. H. Curtiss. There are also indefinite reports of its occurrence in Michigan and on the north shores of Lake Superior. These last records need substantiation and, in general, the rarity of the species is such that the discovery and record of new stations will have more than ordinary interest. It is not improbable that the species from its small size, inconspicuous flowers, and habit, to which Mr. Rand has called attention, of growing in some cases entirely under water, has been overlooked in many localities where it really occurs.

Plate 45, figure 1, representing the flower of *Echinodorus parvulus* shows the petals very short and distinctly obcordate, but it should be said that this was drawn from a young flower scarcely in anthesis, and that a more mature flower would probably exhibit relatively larger petals, which perhaps lose something of their obcordate form. The petals are so thin and "deliquescent" that, it is by no means easy to trace their mature form in dissections made from dried material.

EXPLANATION OF PLATE 45, FIGURES 1 TO 10. Fig. 1, *Echinodorus parvulus*, Engelm., young flower; fig. 2, the same, fruiting head; fig. 3, the same, carpel; fig. 4, the same, submersed state, showing phyllodial leaves; fig. 5, the same, emersed state, showing usual leaf-form. Fig. 6, reproduction of Seubert's probably incorrect figure of the flower of *Alisma tenellum*, Mart. Fig. 7, *Echinodorus radicans*, Engelm., carpel. Fig. 8, *E. rostratus*, Engelm., carpel. Fig. 9, *Alisma Plantago*, L., fruiting head, showing annular arrangement of carpels. Fig. 10, *Echinodorus radicans*, Engelm., fruiting head, showing capitate carpels.

GRAY HERBARIUM.

A NEW BIDENS FROM THE MERRIMAC VALLEY.

M. L. FERNALD.

(Plate 45, figures 11-20.)

IN September, 1902, Mr. Alvah A. Eaton sent to the Gray Herbarium a *Bidens* which for some years he had vainly attempted to reconcile with descriptions. Mr. Eaton's plant occurred on brackish shores of the Merrimac River above Newburyport, and, though in habit and in the shape of its heads it strongly suggested *Bidens bidentoides* of the lower Delaware River, its shorter heads and achenes and shorter stouter awns prevented its identification with that local species.

The plant was so unlike any *Bidens* known to the writer, that arrangements were made with its discoverer for a visit to the station on October second. But since the tide at mid-day was so high that the back-flow of the river covered the brackish shores above Newburyport, the original locality of the plant was inaccessible before late afternoon. In the meantime, however, the marshes on the Salisbury side of the river were explored. There on the brackish margins of streams whose banks are overflowed during high-tide were *Bidens cernua*, *B. connata* and *B. frondosa* and occasional colonies of the strange *Bidens* previously known from above Newburyport. In foliage the plant somewhat resembled *B. connata*, but while that species as well as *B. cernua* and the pinnate-leaved *B. frondosa* invariably had broad hemispherical heads, the plant which had led us to the muddy shores was readily distinguished by its cylindric or narrowly oblong heads. Later in the day, on the muddy shore above Newburyport where Mr. Eaton had first detected the plant with cylindric heads, it was found maintaining its habitual character as it had done by the pools in Salisbury.

A detailed study of the material then collected has shown that the plant of the Merrimac shows affinities with *Bidens connata*, *B. comosa* and *B. bidentoides*.

From *Bidens bidentoides* the Merrimac plant is distinguished by its shorter heads, its much broader achenes and its shorter awns. From *B. connata* and *B. comosa* as already stated it is readily distinguished by its narrow elongate heads, but to both these species it approaches in certain other characters. As in *B. connata* the inner bracts of the

involucre are as long as the disk, but in this they differ strikingly from *B. comosa* whose broad flowering disk much exceeds the inner involucre. In its achenes the Merrimac plant is somewhat intermediate between *B. connata* and *B. comosa*. The achenes of the former are rather tetragonous in section, the ribs on the two faces being very conspicuously thickened and keel-like; and the inner achenes are 4.5 to 6 mm. long. In *B. comosa* the achenes are flat and essentially nerveless, the innermost 8 or 10 mm. long. The achenes of the cylindric-headed plant of the Merrimac shores are essentially flat, but they usually have a well defined though narrow mid-rib on each face, and the innermost achenes from 7 to 9 mm. in length. Thus in its achene the Newburyport and Salisbury plant stands between *B. connata* and *B. comosa*, though it differs from both in the shape of its head in which character it strongly simulates the local and otherwise unique *B. bidentoides*.

The awns of *Bidens bidentoides* are upwardly barbed, instead of with the retrorse barbs which are ordinarily associated with *Bidens*. On this account the plant of the Delaware flats was long supposed to be a *Coreopsis*. Similarly when in 1866 A. H. Smith found near Philadelphia a plant resembling in all other characters *Bidens frondosa*, but with the awns upwardly barbed, the plant was supposed to be a hybrid between *Coreopsis bidentoides* and *Bidens frondosa*, and was later referred to by Dr. Gray as "doubtless a hybrid."¹ Subsequently however, a plant quite identical with the Delaware River material has been found as far east as Cape Breton Island (Macoun, no. 19,168), fully 800 miles from the nearest *Bidens* (*Coreopsis*) *bidentoides*, so that the hybrid origin of the plant seems quite out of the question. This extreme of *B. frondosa* with upwardly barbed awns may be called var. *anomala*, Porter, a name under which the plant was distributed by the late Thos. C. Porter.

Dr. N. L. Britton has recorded² the occurrence of downwardly barbed awns in *Bidens discoidea* which commonly has the barbs ascending, and Dr. K. M. Wiegand has recorded³ upwardly barbed awns in *B. connata*, concluding that such variations are rarely or never due to hybridization. In view of these exceptional tendencies already observed in the related species of *Bidens* it was interesting to

¹ Syn. Fl. i. pt. 2, 296.

² Bull. Torr. Bot. Club, xx (1893) 280.

³ Bull. Torr. Bot. Club, xxvi (1899) 400.

find that many of the plants from the Merrimac shores have the awns upwardly barbed. In the examination of hundreds of heads it has been found that with the exception of one single specimen all the achenes of an individual plant have similarly barbed awns. The material at hand shows that the Delaware River *B. frondosa*, var. *anomala* is likewise essentially constant in its single morphological character, although as in the Merrimac Valley plant it shows no other feature by which it can be distinguished from the more usual form.

It is a striking coincidence that the habitat of *Bidens frondosa*, var. *anomala* and *B. bidentoides*, on brackish mudflats at the mouth of the Delaware River, should be so closely simulated by the brackish shores of the lower Merrimac where alone the plant discovered by Mr. Eaton has been found. *B. frondosa*, var. *anomala*, as already stated, however, has recently been found in Cape Breton and it is probable that the others will eventually prove to be of less restricted distribution than is at present known.

The plant of the Merrimac shores first detected by a botanist whose keen observation is adding materially to our knowledge of a remarkable botanical area, may appropriately bear his name:—

BIDENS Eatonii. Annual, simple or freely branched, 2.5 to 6 dm. high: leaves simple, lanceolate, with long-acuminate tips and slender petiolar bases, coarsely and often deeply serrate, 5 to 15 cm. long: heads erect, cylindric or oblong, in fruit becoming obovoid, longer than broad: outer involucre usually of 3 to 5 foliaceous bracts slightly exceeding the disk: inner involucre mostly of 5 oblong blunt or barely mucronate conspicuously striate bracts about 1 cm. long, equalling the disk: rays none: disk flowers 15 to 25: achenes flat-tish; the inner 7 to 9 mm. long, 1 to 1.7 mm. broad, with well developed but narrow midribs, linear-oblancoate, usually with retrorse hairs on the margins; awns 2 to 4, downwardly barbed, the marginal longest, 3 to 4.3 mm. long, about equalling the pale yellow corollas.—Brackish shores of the Merrimac River, Newburyport, Massachusetts, Sept. 1902 (*A. A. Eaton*), Newburyport and Salisbury, Oct. 2, 1902 (*A. A. Eaton* & *M. L. Fernald*).

Var. fallax. Achenes and awns upwardly barbed.—With the species, but essentially constant in its single morphological character.

EXPLANATION OF PLATE 45, Figs. 11-20. — *Bidens Eatonii*: Fig. 11, portion of flowering plant; fig. 12, outer achene; fig. 13, inner achene. *B. Eatonii*, var. *fallax*: Fig. 14, inner achene. *B. bidentoides*: Fig. 15, flowering head; fig. 16, inner achene. *B. connata*: Fig. 17, flowering head; fig. 18, inner achene. *B. comosa*: Fig. 19, flowering head; fig. 20, inner achene.



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